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09/364,786	07/30/1999	Radhika Thekkath	0077.20	9876

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EXAMINER	
AMINI, JAVID A	
ART UNIT	**PAPER NUMBER**
2672	

DATE MAILED: 12/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/364,786	THEKKATH ET AL.	
	Examiner	Art Unit	
	Javid A. Amini	2672	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 October 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19 and 40-48* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

BY

Response to Arguments

Applicant's arguments filed 10/5/2005 have been fully considered but they are not persuasive.

Applicant on page 9 of the remarks, regarding independent claims 1 and 11 argues that Koss does not disclose "performing a magnitude comparison of absolute values" and Koss does not disclose using "compare instruction".

Examiner's reply: Re. the amended part of independent claim 1, Applicant claims "perform a magnitude comparison between the absolute value of each of the at least one of the plurality of transformed coordinates and the absolute value of the corresponding view volume edges, wherein the magnitude comparison for each transformed coordinate involves a single comparison operation". It is not cleared what Applicant means by using "a single comparison operation", because the claim language indicates comparing two operations, one is the absolute value of transformed coordinates and the other one is the absolute value of the corresponding view volume edges. Also the third operation is the result of this comparison compared with a reference point (e.g. threshold). Applicant needs to clarify the ambiguity of the single comparison operation in future response. Deering at col. 3, lines 19-24 teaches comparing two different operations performed in a single cycle (Examiner interpretation: a single cycle may be similar to a single operation). See specification on page 25, line 14 discloses that the FPU 270 can execute any one of the following floating-point instructions per clock cycle: ADDR, MULR, RECIP2, RSQRT2, CVT.PS.PW, CVT.PW.PS, and CABS.

Applicant on page 10 at first paragraph argues that the references do not teach a" floating point magnitude compare instruction" that can both determine absolute values and compare them.

Examiner's reply: In respect to a definition of "A floating-point number", i.e. a digital representation for a number in a certain subset of the rational numbers, and is often used to approximate an arbitrary real number on a computer. Also the definition for the "absolute values" is, as follows: magnitude of a number or other mathematical expression disregarding its sign; thus, the absolute value is positive, whether the original expression is positive or negative. The reference Deering at col. 1, lines 45-46 under the related art teaches the operations may be performed in either fixed or floating-point math. Deering at col. 15, lines 14-23 teaches the comparisons performed by clip compare unit do not take into account the sign value (bit 31) of the coordinate value stored in register. While the values conveyed to combinatorial logic block by clip compare unit then indicate whether the absolute value of the coordinate is greater than the value of W (indicating that the coordinate is outside of regular or guard band clipping space), the values do not indicate in which direction (positive or negative) the value is to be clipped. Koos at col. 2, line 42 teaches a comparator can be a floating-point comparator. Also Koss in fig. 5 illustrates a block diagram of a floating-point comparator for the clipping.

Applicant on the same page argues that the reference Heinrich does not disclose conversion instructions to and from a paired single floating-point format.

Examiner's reply: Heinrich in table 6-10 illustrates paired single floating-point, e.g. each pair is converted into 32-bit to 64-bit floating-point register. Examiner's comment: Applicant

needs to explicitly specify the significant of converting instructions of the present invention over the prior art's conversion.

Applicant on the same paragraph argues that the reference Heinrich does not teach the floating-point magnitude compare instruction.

Examiner's reply: As Applicant pointed out that the reference on page B-19 teaches C.cond.fmt under the "floating point compare" that arithmetically compared. On the same page discloses the comparisons ignore the sign of zero, which means the floating-point magnitude. Examiner would like the Applicant to specify the significant of the present invention over the prior art.

Applicant on page 11 argues that the reference Koss does not discloses using "performing a magnitude comparison of absolute values" and using "compare instructions".

Examiner's reply: As mentioned in the previous paragraphs Koss in fig. 5 illustrates a floating-point comparator for the clipping preprocessing circuit and using compare instructions. Examiner's comment: Applicant needs to explicitly specify the significant of the claim languages over the prior art.

Examiner's note: Encourages Applicant to schedule an interview to clear the raised issues under Examiner's comment in this respond.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims **1-19 and 40-48** rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation " ... the absolute valve of each of the at least one of the plurality of transformed coordinates ... " in lines 12-13 renders the claim indefinite.

Claim 1 recites the limitation " ... a single comparison operation ... " in line 15 renders the claim indefinite, because the term " a single" can not be determined by one person skill in the art as to mean a cycle or combination of operations or Arithmetic calculations computation.

Claim 1 recites the limitation "the absolute valve of each of" in line 12. There is insufficient antecedent basis for this limitation in the claim.

The rejection to claim 1 hereinabove is also applicable to claim 11.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-19 and 40-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koss et al (5,720,019) in view of Deering (6,169,554), and further in view of Heinrich ("MIPS R4000 Microprocessor User's Manual).

Regarding claim 1, Koss et al discloses that the claimed feature of a method for performing computer graphics view volume clipping comparisons to determine if a vertex is located within a specified view volume, the method comprising: transforming a plurality of coordinates representing the vertex into a plurality of transformed coordinates ["transformed coordinates] (See col. 11 line 17-20, col. 11 line 27-32, col. 11 line 50-60); using a floating point magnitude compare [i.e. "comparator", "floating point comparator", "magnitude comparator"; 206,208,213] instruction to determine an absolute value of at least one of the plurality of transformed coordinates and an absolute value that represents, for each respective at least one transformed coordinate, opposing view volume edges in the specified view volume in a dimension corresponding to the respective at least one transformed coordinate, and perform a magnitude comparison between the absolute value of each of the at least one of the plurality of transformed coordinates and the absolute value of the corresponding view volume edges, wherein the magnitude comparison for each transformed coordinate involves a single comparison operation, and wherein comparison results for at least two view volume edges are obtained. (See col. 2 line 42, col. 3 line 28-39, Fig 5, Fig 6, col. 8 line 27-col. 9 line 37, col. 11 line 67-col. 12 line 3).

Koss et al does not specifically disclose that performing a magnitude comparison of absolute values. However, such limitation is shown in the teaching of Deering. [i.e. comparing [i.e. "clip comparator unit"; 610] objects with boundaries via use of absolute values. [i.e.

"transformed W value" in register 604, "coordinate value" in register 606] [i.e. "the comparisons performed by clip compare unit 610 do not take into account the sign value of the coordinate value stored in register 606] (See Fig 8, col. 15 line 14-24) It would have been obvious to one skilled in the art to incorporate the teaching of Deering into the teaching of Koss et al, in order to operating the clipping process efficiently, as such improvement is also advantageously desirable in the teaching of Koss et al for operating the rendering system with uncomplicated manner.

Also, Koss et al does not explicitly disclose that utilizing the set of compare **instructions**. However, such limitation is shown in the teaching of Heinrich. ["the floating-point compare (C.fmt.cond) instructions interpret the contents of two FPU registers (fs, ft) in the specified format (fmt) and arithmetically compare them"] (See p.171, Table 6-12, B-19) it would have been obvious to one skilled in the art to incorporate the teaching of Heinrich into the teaching of Koss et al, in order to allow the processor for directly performing the specific calculations and operations during graphic rasterization, as such improvement [implementing "compare instructions"] is also advantageously desirable in the teaching of Koss et al for operating the rendering system with optimization.

Regarding claim 2, Koss et al discloses that each of the at least one of the plurality of transformed coordinates are processed in parallel. (See Fig 3-4, Fig 8-9, col. 2 line 34-51, col. 6 line 66-col. 7 line 17, col. 15 line 56-58)

Regarding claim 3, refer to the discussion for the claim 1 hereinabove, Heinrich further discloses that setting a plurality of condition code bits to one or more specific states to indicate results of the magnitude comparison. (See p.159, p.161, p.170; Also See col. 2 line 30-51, col. 8 line 43-col. 9 line 50, col. 11 line 61-col. 12 line 10 in Koss)

Regarding claim 4, refer to the discussion for the claim 1 hereinabove, Heinrich further discloses that specifying a compare condition in the floating point magnitude compare instruction. (See p.159, p.161, p.170)

Regarding claim 5, refer to the discussion for the claim 1 hereinabove, Heinrich further discloses that setting one of the plurality of condition code bits to indicate true if an associated compare condition is true and setting the one condition code bit to indicate false if associated compare condition is false. (See p.159, p.161, p.170)

Regarding claim 6, refer to the discussion for the claim 1 hereinabove, Heinrich further discloses that converting a plurality of fixed point values into a plurality of floating point values using a first convert instruction. (See p.170, B-10)

Regarding claim 7, refer to the discussion for the claim 1 hereinabove, Heinrich further discloses that the first convert instruction is a CVT.PS.PW instruction. (See B-9, B-10)

Regarding claim 8, refer to the discussion for the claim 1 hereinabove, Heinrich further discloses that converting a plurality of floating point values into a plurality of fixed point values using a second convert instruction. (See p.170, B-10, B-21, B-23)

Regarding claim 9, refer to the discussion for the claim 1 hereinabove, Heinrich further discloses that the second convert instruction is a CVT.PS.PW instruction. (See B-9, B-10)

Regarding claim 10, refer to the discussion for the claim 1 hereinabove, Heinrich further discloses that the floating point magnitude compare instruction is a CABS instruction. (See p.171, B-9, B-10, B-19)

Regarding claim 11, claim 11 is similar in scope to the claims 1, and thus the rejection to claim 1 hereinabove is also applicable to claim 11.

Regarding claim 12, claim 12 is similar in scope to the claim 3, and thus the rejection to claim 3 hereinabove is also applicable to claim 12.

Regarding claim 13, claim 13 is similar in scope to the claim 4, and thus the rejection to claim 4 hereinabove is also applicable to claim 13.

Regarding claim 14, claim 14 is similar in scope to the claim 5, and thus the rejection to claim 5 hereinabove is also applicable to claim 14.

Regarding claim 15, claim 15 is similar in scope to the claim 6, and thus the rejection to claim 6 hereinabove is also applicable to claim 15.

Regarding claim 16 claim 16 is similar in scope to the claim 7, and thus the rejection to claim 7 hereinabove is also applicable to claim 16.

Regarding claim 17, claim 17 is similar in scope to the claim 8, and thus the rejection to claim 8 hereinabove is also applicable to claim 17.

Regarding claim 18, claim 18 is similar in scope to the claim 9, and thus the rejection to claim 9 hereinabove is also applicable to claim 18.

Regarding claim 19, claim 19 is similar in scope to the claim 10, and thus the rejection to claim 10 hereinabove is also applicable to claim 19.

Regarding claim 40, claim 40 is similar in scope to the claim 29, and thus the rejection to claim 29 hereinabove is also applicable to claim 40.

Regarding claim 41, claim 41 is similar in scope to the claim 29, and thus the rejection to claim 29 hereinabove is also applicable to claim 41.

Regarding claim 42, refer to the claim 1 hereinabove; Heinrich discloses that the floating-point magnitude compare instruction is part of a general-purpose instruction set architecture. (See p.159, p.161, p.170)

Regarding claim 43, refer to the claim 1 hereinabove; Heinrich discloses that the floating-point magnitude compare instruction is part of an application specific extension to a general purpose instruction set architecture. (See p.159, p.161, p.170)

Regarding claim 44, refer to the claim 1 hereinabove; Deering discloses that the floating-point magnitude compare instruction is executed in a single clock cycle. (See col. 3 line 20-23, col. 6 line 21-24)

Regarding claim 45, claim 45 is similar in scope to the claim 2, and thus the rejection to claim 2 hereinabove is also applicable to claim 45.

Regarding claim 46, claim 46 is similar in scope to the claim 42, and thus the rejection to claim 42 hereinabove is also applicable to claim 46.

Regarding claim 47, claim 47 is similar in scope to the claim 43, and thus the rejection to claim 43 hereinabove is also applicable to claim 47.

Regarding claim 48, claim 48 is similar in scope to the claim 44, and thus the rejection to claim 44 hereinabove is also applicable to claim 48.

Claims 1 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koss et al (5,720,019) in view of Dubey et al (6,298,365), and further in view of Heinrich ("MIPS R4000 Microprocessor User's Manual).

Regarding claim 1, Koss et al discloses that the claimed feature of a method for performing computer graphics view volume clipping comparisons to determine if a vertex is

located within a specified view volume, the method comprising: transforming a plurality of coordinates representing the vertex into a plurality of transformed coordinates ["transformed coordinates] (See col. 11 line 17-20, col. 11 line 27-32, col. 11 line 50-60); using a floating point magnitude compare [i.e. "comparator", "floating point comparator", "magnitude comparator"; 206,208,213] instruction to determine an absolute value of at least one of the plurality of transformed coordinates and an absolute value that represents, for each respective at least one transformed coordinate, opposing view volume edges in the specified view volume in a dimension corresponding to the respective at least one transformed coordinate, and perform a magnitude comparison between the absolute value of each of the at least one of the plurality of transformed coordinates and the absolute value of the corresponding view volume edges, wherein the magnitude comparison for each transformed coordinate involves a single comparison operation and wherein comparison results for at least two view volume edges are obtained. (See col. 2 line 42, col. 3 line 28-39, Fig 5, Fig 6, col. 8 line 27-col. 9 line 37, col. 11 line 67-col. 12 line 3)

Koss et al does not specifically disclose that performing a magnitude comparison of absolute values. However, such limitation is shown in the teaching of Dubey et al. [" **a single** floating-point bounds comparison"] (See Abstract, col. 1 line 41-60, col. 3 line 35-col. 4 line 24, col. 7 line 1+) It would have been obvious to one skilled in the art to incorporate the teaching of Dubey into the teaching of Koss et al, in order to provide "a quick and easy (less complex) comparison function within computer instruction set architectures" (See col. 1 line 35-36, col. 1 line 52-60 in Dubey), as such improvement is also advantageously desirable in the teaching of Koss et al for operating the rendering system with uncomplicated manner.

Also, Koss et al does not explicitly disclose that utilizing the set of compare **instructions**. However, such limitation is shown in the teaching of Heinrich. ["the floating-point compare (C.fmt.cond) instructions interpret the contents of two FPU registers (fs, ft) in the specified format (fmt) and arithmetically compare them"] (See p.171, Table 6-12, B-19) it would have been obvious to one skilled in the art to incorporate the teaching of Heinrich into the teaching of Koss et al, in order to allow the processor for directly performing the specific calculations and operations during graphic rasterization, as such improvement [implementing "compare instructions"] is also advantageously desirable in the teaching of Koss et al for operating the rendering system with optimization.

Regarding claim 11, claim 11 is similar in scope to the claims 1, and thus the rejection to claim 1 hereinabove is also applicable to claim 11.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Javid A. Amini whose telephone number is 571-272-7654. The examiner can normally be reached on 8-4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Razavi can be reached on 571-272-7664. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Javid A Amini
Examiner
Art Unit 2672

Javid Amini